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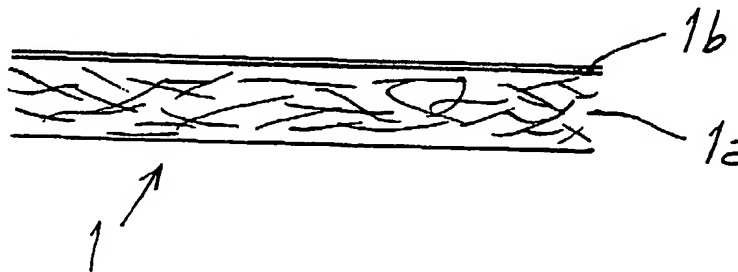
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19/82 **TANI, Petri [FI/FI]; Rengastie 24 D 23, FIN-37630  
Valkeakoski (FI).**
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son, Helmer, P.O. Box 40, FIN-37601 Valkeakoski (FI).
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- (71) Applicant (*for all designated States except US*): **UPM-  
KYMMENE CORPORATION [FI/FI]; Eteläesplanadi 2,  
FIN-00130 Helsinki (FI).**
- (72) Inventors; and
- (75) Inventors/Applicants (*for US only*): **KOSKINEN, Kaj**  
[FI/FI]; Eerolankaari 8, FIN-37630 Valkeakoski (FI).  
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ance Notes on Codes and Abbreviations" appearing at the begin-  
ning of each regular issue of the PCT Gazette.*

(54) Title: **BASE PAPER, METHOD TO PRODUCE IT AND RELEASE PAPER**



(57) Abstract: A base paper for a release paper comprises a body layer (1a) which is formed of a fibre raw material and whose surface is provided with a surface sizing (1b) containing hinder and pigment, forming a surface to receive a release agent. The pigment-containing binder of the surface sizing (1b) contains at least polyvinyl alcohol (PVA) and a latex dispersion in a mixture.

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**Base paper, method to produce it and release paper**

The invention relates to a base paper for a release paper, the base paper comprising a body layer which is formed of a fibre raw material and whose  
5 surface which receives a release agent is provided with a surface sizing containing binder and pigment. The invention also relates to a release paper whose base paper is of the above-mentioned type, as well as a method for the manufacture of such a base paper.

10 Release papers are used as backing papers for various adhesive labels, wherein they are provided, on the surface which will be positioned against the adhesive layer of the label, with a release agent which can be easily detached from the adhesive and is usually a layer formed of a material based on silicone polymers.

15 Most of the base papers presently on the market are used for silicone coating with a solvent-free silicone system. As this method has become more common, the surface properties of the base paper of the release paper have become more significant in achieving a good siliconized  
20 surface quality. Due to the properties of silicone, the low porosity, low water and oil absorptivity, and high smoothness of the base paper have become more important.

The functional demands on the base paper for the release paper are  
25 complex, due to the wide range of use and the difficult applications. The essential properties of the base paper include: strength properties (also after thermal treatment), dimensional stability, high density, barrier properties, chemical suitability for siliconization, high transparency, low porosity, and good smoothness. A well-functioning base paper is passed  
30 without breaks on a converting machine, requires little silicone for good silicone coverage, functions without problems in die cutting of a laminate, and does not cause problems in labelling.

To improve the quality of the base paper, it is known to provide at least its  
35 surface which receives the release agent, with a suitable substance. Consequently, US patent 4,859,511 presents a layer of an intrinsically hydrophobic polymer between the base paper and the release agent. It is

also known to coat the base paper before applying the release agent with a mixture of a latex binder and a pigment, as disclosed in US patent 4,609,589 (example #47), to which corresponds EP application publication 150 772, in international application publication WO 96/31651, and in Japanese application publication JP-6-264038. In the last mentioned publication, the surface size contains 100 weight parts of pigment, 10 to 30 weight parts of styrene butadiene latex as a hydrophobic binder, and 0.5 to 5 weight parts of oxidation modified starch and/or starch phosphate as a hydrophilic binder. In prior art, the quantity of application of the surface adhesive is typically about 3 g per square metre.

The mixture of polyvinyl alcohol (PVA) and carboxymethyl cellulose (CMC) is a commonly used surface size for papers. This has also been used in the surface sizing formula for the base paper which receives a release agent. Provision of a closed surface, with either a well-sealing thin surface sizing layer or a large quantity of the surface size, will result in a release paper with good properties. However, it has been found that the PVA/CMC mixture is not capable of filling pores of variable sizes on the surface of the paper.

The aim of the invention is to provide a new base paper which can, thanks to its surface sizing, be better siliconized, in the sense of reducing the quantity of silicone required for good silicone coverage. The improved properties of the base paper to achieve this are low porosity and hydrophobicity of the paper.

To achieve this aim, the invention is primarily characterized in that the pigment-containing binder for the surface sizing contains at least polyvinyl alcohol (PVA) and latex dispersion in a mixture. A mixture based on this, with suitable mutual ratios, has resulted in better values in many properties which are important in view of siliconization.

According to an advantageous embodiment, the adhesive also contains carboxymethyl cellulose (CMC), preferably 10 to 50 wt-%, more advantageously 15 to 25 wt-%, of the total quantity of PVA and CMC.

Furthermore, with combinations based on the above adhesives, good results are achieved by applying relatively small quantities. According to an advantageous embodiment, the quantity of the surface sizing, as dry substance, is  $2 \text{ g/m}^2$  at the most, advantageously  $0.7$  to  $2.0 \text{ g/m}^2$ , preferably  $0.7$  to  $1.5 \text{ g/m}^2$ , which increases the cost-effectiveness of the manufacture of the base paper, and the transparency remains good as well.

In the following, the invention will be described with reference to the appended drawing, in which

Fig. 1 shows, in a schematic cross-section, one possible adhesive label product, in which the release paper can be used, and

Fig. 2 shows the release paper in a schematic cross-section.

The figures are presented to illustrate the field of use of the invention, and the relative sizes of their parts are not intended to show the real situation.

According to Fig. 1, the adhesive label product consists of a base paper P having an adhesive layer 4, and a release paper R having a release agent layer 3 which is against the adhesive layer 4. On the other side of the surface paper 2, text and/or patterns can be printed by various printing methods.

Figure 2 shows the base paper 1 for the release paper R intended for the adhesive label product of Fig. 1. The base paper 1 has a body layer 1a which is formed of a suitable fibre raw material, such as cellulose-based paper pulp. A surface sizing 1b is provided on the body layer 1a, at least on the side which will be provided with a layer of the release agent.

The following is a description of the method for the manufacture of the label product, as an example which does not restrict the invention.

In the manufacture of the adhesive label product, the surface paper of the label product and the base paper of the release paper are introduced as rolls with a fixed width and length to the production line. The base paper is

- first coated in a roll coating unit with a silicone layer which is polymerized and cured at 140°C in an oven. The quantity of silicone applied is about 1 g/m<sup>2</sup>. In this way, a release paper is obtained whose surface is provided with a layer of the release agent. Next, the release paper is coated with an
- 5 adhesive layer on its siliconized side. The adhesive is normally an aqueous dispersion, from which extra water is evaporated in a dryer. After the drying, the web is passed through a wetting unit to achieve a suitable moisture level. The back paper and the surface paper are laminated together by running them between rolls which press the layers together.
- 10 The ready laminate is collected on a roll. The laminate can be reprocessed in a variety of ways, for example, printed with a printing machine. It is also possible to punch out labels of suitable size from the laminate after the printing. The release paper provided with a release agent layer can also be introduced as a ready product to the production
- 15 line and be combined there with the surface paper of the label product.

The following is a description of tests made on the invention, which do not restrict the scope of protection of the invention.

- 20 A known PVA/CMC surface size, a known barrier coating used for paper and board based packaging materials, and mixtures of these were used in surface sizing tests. In the first test series, known surface size and coating compositions were tested separately, and in the second series, tests were made on mixtures of these compositions.

25

The known surface size (below: surface size) was a mixture of polyvinyl alcohol and carboxymethyl cellulose (PVA/CMC) dissolved in water, wherein the ratio between PVA and CMC was 80:20, based on weight parts.

30

- The known barrier coating (below: barrier) was an aqueous pigment paste which is intended for paper and board packaging materials and provides barrier properties, and in which the main components are 2 weight parts of talc and 1 weight part of styrene-butadiene latex dispersion, based on
- 35 the dry substance. The additives and adjuvants were the same as those used in coating mixes for paper industry.

The surface sizings were made on a paper with a film size press, after which the sizing was dried and the paper was calendered.

#### First tests

5

- In the first test series, the known barrier coating used in the reference tests had poorer results e.g. in Bekk porosity, in IGT stain length which correlates with the surface smoothness, and in Unger oil absorption, compared with the known surface size, at those coating quantities (less than 3 g/m<sup>2</sup>) which can be used without losing the transparency. The poor result of Unger oil absorption means that too much silicone is absorbed in the paper. On the other hand, in the Shirlastain test which is commonly used for testing the hydrophobicity of the surface of siliconized papers, based on the absorption of an aqueous test solution, a clear improvement was achieved with the known barrier coating, compared with the known surface size.

#### Second tests

- 20 Better results were achieved with a surface sizing composition in which the known surface size and the known barrier coating were mixed with each other in a ratio of equal quantities, calculated from the dry substance (below: "mixture").
- 25 Bekk porosity values (s/100 ml) with coating quantities of 1.5 g/m<sup>2</sup>:
- |               |           |
|---------------|-----------|
| Surface size: | about 190 |
| Barrier:      | about 20  |
| Mixture:      | about 900 |
- 30 Bekk porosity values (s/100 ml) with coating quantities of 0.7 g/m<sup>2</sup>:
- |               |           |
|---------------|-----------|
| Surface size: | about 210 |
| Barrier:      | about 20  |
| Mixture:      | about 280 |

Unger oil absorption values ( $\text{g/m}^2$ ) with coating quantities of  $1.5 \text{ g/m}^2$ :

Surface size: about 0.85

Barrier: about 2.5

Mixture: about 0.65

5

Absorption of silicone ( $\text{g/m}^2$ , silicone test similar to the Unger test),  
coating quantities of  $1.5 \text{ g/m}^2$ :

Surface size: about 0.9

Mixture: about 0.7

10

coating quantities of  $0.7 \text{ g/m}^2$ :

Surface size: about 1.0

Mixture: about 0.8

15 Shirlastain test (absorption of solution,  $\text{g/m}^2$ ) with coating quantities of  $1.5 \text{ g/m}^2$ :

Surface size: about 16

Barrier: about 12

Mixture: about 14

20

Shirlastain test (absorption of solution,  $\text{g/m}^2$ ) with coating quantities of  $0.7 \text{ g/m}^2$ :

Surface size: about 18

Barrier: about 14

25 Mixture: about 15

IGT stain length (cm) with coating quantities of  $1.5 \text{ g/m}^2$ :

Surface size: about 13.7

Mixture: about 14.1

30

With the mixture of 50:50, a clear improvement was achieved in the oil absorption and a considerable improvement in the Bekk porosity, compared with both references. Similarly, the results in the absorption of the Shirlastain test fluid were better than with the known surface size.

35

Furthermore, the results were better than with the known surface size when the ratios between the surface size and the barrier ranged between

40:60 and 60:40. Considering the compositions of the above substances and the fact that good results, in at least some properties, can be achieved even beyond the above-mentioned limit values, the content of pigment in the total surface sizing is about 20 to 45 wt-%, and the amount  
5 of latex in relation to the rest of the binder is 20 to 55 parts per 100 parts.

It can be assumed that the components of the composition have a combined effect to achieve an optimal result in such a way that the PVA/CMC adhesive acts as a film former, the fine-grained pigment  
10 (average particle size preferably less than 2  $\mu\text{m}$  expressed in equivalent diameter, e.s.d.) fills in the pores, and the styrene-butadiene latex binder increases the water repellence.

As the pigment, it is possible to use, instead of talc, also other fine mineral  
15 fillers or mixtures of mineral fillers. The mineral filler is preferably intrinsically hydrophobic, which is typical of talc (e.g. US 5,229,094).

As the latex binder, it is also possible to use other homo- and copolymer latex dispersions. Examples include acrylate, styrene-acrylate and  
20 polyvinyl acetate latexes.

In addition to the latex dispersion and the PVA or the PVA/CMC mixture, the adhesive component can contain other binders, at a maximum of 10 wt-% of the total quantity of the binder.  
25

The surface of the paper can be made tighter and more water-resistant by using only small quantities of the coating according to the invention, for example at a maximum of 2  $\text{g}/\text{m}^2$ . Only coating quantities of about 1  $\text{g}/\text{m}^2$  are sufficient to achieve sufficient surface properties of the base paper.  
30

The surface sizing mixture can be applied as an aqueous composition in which the latex binder, the polyvinyl alcohol, possibly carboxymethyl cellulose, and the pigment are well mixed with each other, onto the body layer by suitable coating methods. The body layer is preferably an  
35 uncoated paper made of chemical pulp, for example a mixture of softwood pulp and hardwood pulp. In connection with the surface sizing, the body layer can also be sized on the other side, to prevent curling.



The basis weight of the obtained base paper is usually from 50 to 90 g/m<sup>2</sup>.

Claims:

1. A base paper for a release paper, comprising a body layer (1a) which is formed of a fibre raw material and whose surface is provided with a surface sizing (1b) containing a binder and pigment and forming a surface to receive a release agent, **characterized** in that the pigment-containing binder of the surface sizing contains at least polyvinyl alcohol (PVA) and a latex dispersion in a mixture.
2. The base paper according to claim 1, **characterized** in that the binder also contains carboxymethyl cellulose (CMC).
3. The base paper according to claim 2, **characterized** in that the ratio between the polyvinyl alcohol and the CMC, based on weight parts, is between 50:50 and 90:10, preferably between 75:25 and 85:15.
4. The base paper according to any of the preceding claims, **characterized** in that the pigment is talc.
5. The base paper according to any of the preceding claims, **characterized** in that the amount of pigment is 10 to 50 wt-%, preferably 25 to 40 wt-% of the dry matter of the surface sizing (1b).
6. The base paper according to claim 5, **characterized** in that the amount of pigment is 30 to 37 wt-%.
7. The base paper according to any of the preceding claims, **characterized** in that the ratio between the latex dispersion and the polyvinyl alcohol or, if the adhesive contains CMC, the mixture of PVA and CMC, is between 20:100 and 55:100.
8. The base paper according to claim 7, **characterized** in that the ratio is between 30:100 and 40:100.
9. The base paper according to any of the preceding claims, **characterized** in that the quantity of the surface sizing (1b) is less than 2 g/m<sup>2</sup>, preferably from 0.7 to 1.5 g/m<sup>2</sup>.

10. The base paper according to any of the preceding claims, **characterized** in that the body layer (1a) is of chemical pulp, for example a mixture of softwood pulp and hardwood pulp.
- 5 11. The base paper according to any of the preceding claims, **characterized** in that its basis weight is 50 to 90 g/m<sup>2</sup>.
- 10 12. A method for manufacturing a base paper for a release paper (R), in which a body layer (1a) which is formed of a fibre raw material is provided with a surface sizing containing binder and pigment, **characterized** in that the binder of the surface size contains at least polyvinyl alcohol (PVA) and a latex dispersion in a mixture.
- 15 13. The method according to claim 12, **characterized** in that the surface sizing is made by mixing an aqueous mixture of a latex dispersion and pigment, and an aqueous solution of polyvinyl alcohol which possibly also contains carboxymethyl cellulose, with each other.
- 20 14. The method according to claim 12 or 13, **characterized** in that the surface sizing is applied onto the body layer (1a) in an amount of 2 g/m<sup>2</sup> at the most, preferably 7 to 1.5 g/m<sup>2</sup>.
- 25 15. A release paper which is equipped, on its surface which comes against the adhesive layer of an adhesive label product, with a release agent layer (3) applied onto a base paper (1), **characterized** in that the release agent layer (3) is applied onto a surface sizing (1b) according to any of the preceding claims 1 to 11.

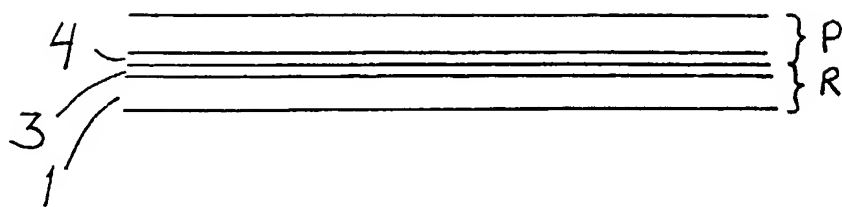


Fig. 1

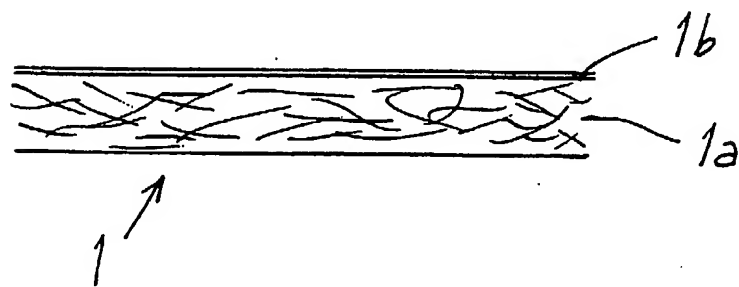


Fig. 2

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI 01/00056

## A. CLASSIFICATION OF SUBJECT MATTER

IPC7: D21H 27/00, D21H 19/82

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: D21H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5603996 A (DERRIC OVERCASH ET AL), 18 February 1997 (18.02.97), column 3, line 37 - line 60, claims 1-6, abstract  --	1,5-12,14-15
A	US 4859511 A (ROBERT PATTERSON ET AL), 22 August 1989 (22.08.89), claim 1  --	1-15
A	Derwent's abstract, No 1994-338498 DW199442, ABSTRACT OF JP, 6264038 A (OJI PAPER CO) 1994-09-20  --	1-15
A	EP 396789 A1 (KÄMMERER GMBH), 14 November 1990 (14.11.90), claims 1-3, example 1  --	1-15

☒ Further documents are listed in the continuation of Box C.
 ☒ See patent family annex.

- \* Special categories of cited documents
- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier application or patent but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed
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- "X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- "&" document member of the same patent family

Date of the actual completion of the international search

15 May 2001

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Name and mailing address of the ISA:

 Swedish Patent Office  
 Box 5055, S-102 42 STOCKHOLM  
 Facsimile No. +46 8 666 02 36

Authorized officer

 Barbro Nilsson/MP  
 Telephone No. +46 8 782 25 00

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI 01/00056

## C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	Derwent's abstract, No 1984-241111, DW198439, ABSTRACT OF JP 59144693 A, (SANYO KOKUSAKU PULP CO), 1984-08-18  --	1-15
A	Derwent's abstract, No 1980-17494C, DW198242, ABSTRACT OF JP 55012127 (HONSHU PAPER MFG CO LTD), 1980-01-28  -- -----	1-15

INTERNATIONAL SEARCH REPORT  
Information on patent family members

International application No.  
PCT/FI 01/00056

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US 5603996 A	18/02/97	AU 677364 B AU 5098793 A DE 69322618 D EP 0624060 A,B JP 7509414 T AT 174472 T CA 2128620 A US 5981011 A WO 9314642 A	24/04/97 19/07/94 00/00/00 17/11/94 19/10/95 15/01/99 05/08/93 09/11/99 05/08/93
US 4859511 A	22/08/89	EP 0302207 A FI 883090 A JP 1065183 A	08/02/89 31/12/88 10/03/89
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